



Semester 1 Examinations 2014 / 2015

Exam Code(s)	4BCT, 4BLE1, 4BN1, 4BP1
Exam(s)	B.Sc. Degree (Computer Science and Information Technology) Bachelor of Engineering (Electrical & Electronic) Bachelor of Engineering (Electronic) Bachelor of Engineering (Electronic & Computer Engineering)
Module Code(s)	CT417
Module(s)	Software Engineering III
Paper No.	I
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Internal Examiner(s)	Prof. G. Lyons Dr. Michael Madden *Dr. Jim Duggan *Dr. David O'Sullivan

Instructions:

Answer any 3 questions. All questions will be marked equally.

For Q5, please detach the final page (with your name and ID number included) and hand it up with your answer book.

Duration	2hrs
No. of Pages	6 (Including Cover Page)
Department(s)	Information Technology

Requirements	Please detach Question 5 on this paper, ensuring name and student id number are completed and hand up along with the Answer Book.
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1. (a) Explain the key ideas underlying Albrecht's Function Point Analysis, and summarise the strengths and weaknesses of this estimation approach.

(5)

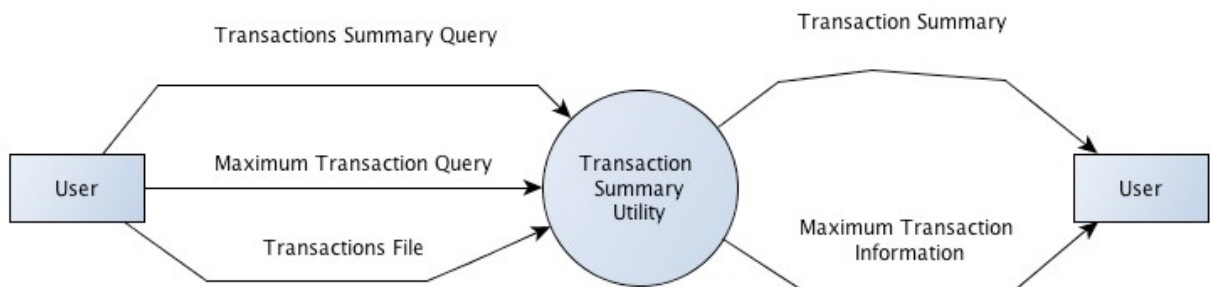
- (b) Calculate the Unadjusted Function Point Count (UFC) for the system summarized in the context diagram below. Assume a weighting factor of average complexity, based on the following values:

Item	Weighting Factor
External inputs	4
External outputs	5
External inquiries	4
External files	10
Internal files	7

(10)

- (c) Assuming that 6 out of the 14 categories of technical complexity factors are relevant for this system, where five of these have a weighting of 3, and one has a weighting of 5, calculate the Adjusted Function Point Count for this design.

(5)



2. (a) Describe, using examples, the following object-oriented measures:

- Weighted methods per class
- Class size

(4)

(b) For the following class, calculate the Lack of Cohesion of Methods (LCOM) measure.

```
class Stock
{
    String code;
    double price;
    int onHand;

    public getCode(){ return this.code}

    public getPrice(){return this.price}

    public getOnHand(){return this.onHand}

    public setPrice(double p)
    {
        this.price = p
    }

    public incrementStock(int amt)
    {
        this.onHand+=amt
    }

    public decrementStock(int amt)
    {
        this.onHand---=amt
    }
}
```

(14)

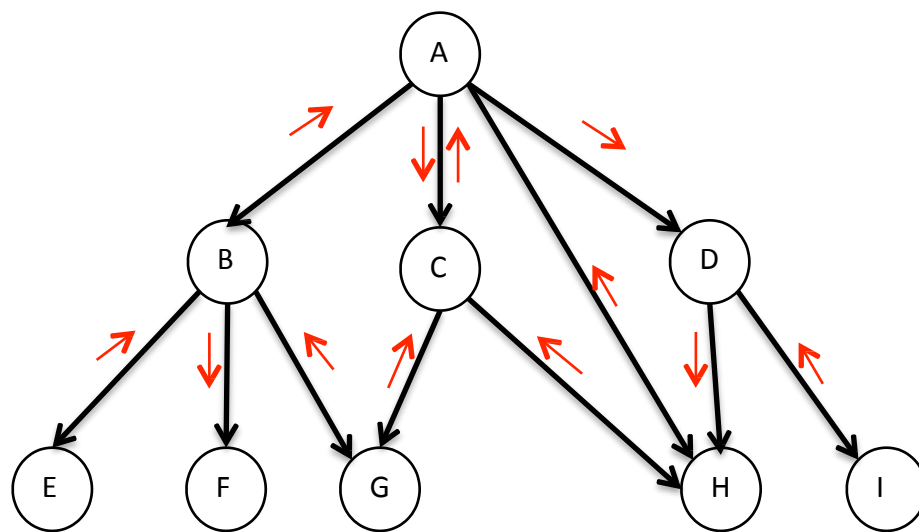
(c) Does the result fairly represent how cohesive this class is?

Discuss the strengths and weaknesses of the LCOM approach.

(2)

3. (a) Consider the following module call graph, which models the inter-module relationships and information sharing between modules. Based on this, calculate the following measures:

- System morphology (size, depth, width, edge-to-node ratio)
- Tree impurity measure
- Internal reuse measure



(12)

- (b) Based on the following additional information, calculate the information flow complexity for modules {A, B, C and D}.

Module	LOC
A	100
B	15
C	150
D	200

(5)

- (c) Comment on the relationships between each of the four metrics calculated in (a) and (b), and the overall expected quality of code.

(3)

4. (a) Assuming the classic reliability function based on the exponential probability density function (pdf):

$$f(t) = \lambda e^{-\lambda t}$$

Show (no need to derive) the functions for the

- CDF, $F(t)$
- Reliability function, $R(t)$.

Explain the relationship between λ and the mean time to failure (MTTF).

(6)

- (b) A software system fails on average once every six months. Assuming a probability density function based on the exponential distribution, calculate:

- the hazard rate of the system,
- the probability that the system will fail in the first month of operation.
- the reliability of the system after 6 months of operation.

(6)

- (c) Define the main assumption underlying the Jelinski---Moranda (JM) model of software reliability. Clearly show the formulation for the hazard rate.

Assuming the initial number of faults (N) in the system is 10, predict the MTTF for the system after each successive system repair. Assume that $\phi = 0.0035$, where ϕ is the contribution of each fault to the failure rate.

Plot the sequence of MTTF values and comment on the shape of the curve.

Finally, what feature of the JM model makes it more suited to modelling software instead of hardware systems?

(8)

Question 5

Place a mark beside the **one** correct answer to all the questions below. When complete please **detach this page** and **hand---up** with your answer book.

Print Your Name: _____ Print Your Student ID: _____

1. Change and innovation applies to which one of the following types of organization?	Hospitals		Colleges		Business		All	
2. Which one of the following best defines innovation?	Creating something new that has never existing before		Generating ideas that can add value		Invention and exploitation		Project Management	
3. When describing the diffusion curve, which one of the following is not a key group of customers?	Early Adopters		Late Majority		Laggards		Customers	
4. Which of the following is not a driver of innovation?	Late Majority		Emerging Technologies		Competitor Actions		Customer Demands	
5. Kotter mentions eight steps. Which is the odd one out?	Urgency		Vision		Communications		Success	
6. Which of the following is not a SWOT category?	Strengths		Weaknesses		Competitors		Opportunities	
7. Stakeholders in any organization do not typically include the following?	Employees		Customers		Suppliers		Performance	
8. Which one of the following is not a strategic thrust in the Balanced Scorecard technique?	Learning and Growth		Finance		Strategies		Customers	
9. Which of the following is the odd one out?	Ideas come from everywhere		Creativity loves constraints		Set individual expectations		Don't take risks	
10. Which of the following is the best example of a performance indicator?	Reduce absenteeism by 3%		Metric		Leading Indicator		Reduce Costs	
11. Choose the best example of a 'leading' indicator	Defects/Unit		Customer Rating		Revenue Generated		Annual Sales	
12. Deborah Amabile defines creativity as including which one of the following?	Fantasy		Imagination		Ingenuity		Motivation	
13. Which of the following is the least common tool used for idea creation:	Voting		Cause---effect diagrams		Matrices		Salary Negotiation	
14. Brainstorming involves which one of the following:	Wild Ideas		Safe Ideas		Mindlessness		No Ideas	
15. Project management is more about which one of the following?	Managing a group of tasks		Managing organizational goals		Ranking a portfolio of projects		Keeping everyone busy	
16. Quantifying risks involves which one of the following?	Monitoring progress very closely		Severity		Number of Tasks		Generating actions that eliminate risks	
17. A project costs 100k and generates revenue of 100k with no additional annual costs. The payback is:	Zero		One Year		Ten Years		Added Value	
18. Which of the following is not an approach to portfolio management?	Minimizing value of portfolio		Creating right mix of projects		Maximizing goal alignment		Optimizing resources	
19. Which of the following is not a typical leadership skill?	Listening		Avoiding		Delivering		Enabling	
20. Which is the odd one out?	Effective team		Lightweight team		Heavyweight team		Functional team	